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# A comparison study of student test scores on the Iowa Test of Basic Skills and the Cognitive Abilities Test: developmental kindergarten students and general student population in the Ankeny Community Schools

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A comparison study of student test scores on the  
Iowa Test of Basic Skills and the Cognitive Abilities Test:  
Developmental Kindergarten students and general student population  
in the Ankeny Community Schools

by

Nancy Sue Moorhead

A Thesis Submitted to the  
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Signatures have been redacted for privacy

Iowa State University  
Ames, Iowa

1992

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## INTRODUCTION

America 2000: An Education Strategy, is an ambitious long-range plan which has been designed to move every community in the United States toward the six national education goals. These goals, which were adopted by the president and the governors in 1990, are intended to close our skills and knowledge gap (U.S. Dept. of Education, 1991). Major changes need to happen in our 110,000 public and private schools, and America 2000 will help us get there.

The six goals established in this education strategy are as follows:

- 1) All children in America will start school ready to learn.
- 2) The high school graduation rate will increase to at least 90 percent.
- 3) American students will leave grades four, eight, and twelve having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography; and every school in America will ensure that all students learn to use their minds well, so they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy.
- 4) U.S. students will be first in the world in science and mathematics achievement.
- 5) Every adult American will be literate and will possess the

knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship.

- 6) Every school in America will be free of drugs and violence and will offer a disciplined environment conducive to learning:

This study will focus on goals one, two, and three which emphasize a readiness level prior to the onset of formal education in a kindergarten program, the need to ensure student success through grade twelve, and the necessity for preparing students for competency in the content areas as well as for life-long learning and skills necessary to become a productive member of society. If these ambitious goals are to be accomplished, educators must focus on the best programs for early childhood education and continue to address developmentally appropriate practices throughout the education system.

In relationship to the stated goals, the state of Iowa has taken a lead and is on the cutting edge of reforms to address the issues facing early childhood education. From May to October 1991, a 40-member Strategic Planning Council of the Iowa Department of Education framed the critical issues and proposed recommended plans to address those issues in "A Blueprint for Excellence: Today's Vision--Tomorrow's Mission" (1991). Recommendation number 1.12 addresses "Developmentally Appropriate Early Child Instruction", and states that school districts will review early childhood (birth-age 8) curriculum to ensure that it reflects materials, activities and assessments that are developmentally appropriate. The schools will adopt early childhood

education programs so that every child is guaranteed an equal opportunity to participate in programming that has a proven success record.

The Iowa State Education Association Report, "Time for a Change: A Report to the People of Iowa from the Teachers of Iowa" (1991), included a list of proposals for early childhood education. The issued report states that reform can be made effective and permanent if the structure of elementary education is transformed to include dealing with the needs of the whole child from birth through ability levels now associated with grade three. The proposal calls for the elementary school being a new professional setting or "Early Childhood Centers" which is based on needs of children. While not all children will require help from birth, help would be available as necessary.

#### Need for the study

There has been action on, and reaction to, the goals of America 2000 as well as the proposals of the Iowa Department of Education and the Iowa State Education Association. Currently, many educators and school districts across the state of Iowa have begun to examine their programs for young children.

With an increasing awareness of, and concern for, early childhood education and developmentally appropriate practices for all children, there is confusion about an assessment process for readiness and for exterior programs. If school districts are to address the goals and



recommendations for early childhood education, they must look to research and then study their current practices to ascertain areas which may need attention.

Since 1985 the Ankeny Community School System has had an exterior program, Developmental Kindergarten, for children who are chronologically five years of age by September 15th, but yet are identified as having developmental deficiencies which may limit their success. For this school district to evaluate its program and plan for meeting the needs of the students, a follow-up study of the Developmental Kindergarten students was needed.

#### Purpose of the study

This project is designed to investigate the relationship of the test scores in grades one through five for students who have completed a year of Developmental Kindergarten to the district composite for all of the students in the Ankeny Community School District. The study was undertaken to investigate student test scores to determine if a correlation exists between students who have participated in the Developmental Kindergarten program and their success in subsequent years of schooling, as measured by standardized norm-referenced tests.

Student scores on the Iowa Test of Basic Skills and the Cognitive Ability Test were compared to the scores of the overall Ankeny Community Schools student population during identical years and grades. This study was conducted with the cooperation of the Ankeny

Schools and with permission of the parents of students in the Developmental Kindergarten program. Approval by the Human Subjects Review Committee at Iowa State University was received prior to compilation and use of the data.

### Research questions

The examination of data focused on the following four questions.

- 1) Is there a significant difference at the .05 level between the grade equivalent of the Developmental Kindergarten cohort groups and the general population of the district on the Iowa Test of Basic Skills composite grade equivalent score?
- 2) How does the mean score of the National Percentile Rank on the Iowa Test of Basic Skills and the Cognitive Abilities Test differ between the Developmental Kindergarten cohort groups and the overall Ankeny student population?
- 3) What is the range of percentile rankings for the Developmental Kindergarten cohort groups on the Iowa Test of Basic Skills and the Cognitive Abilities Test?
- 4) What percent of the Developmental Kindergarten students scored above, (and by comparison, below) the district means on the Iowa Test of Basic Skills and the Cognitive Abilities test?

### Assumptions of the study

The assumptions included in this study are as follows:

- 1) It is assumed that the scoring and the reporting of the test scores are accurate. (The University of Iowa Testing Service is responsible for the computer scoring and the reporting of scores for student and district totals.)
- 2) It is assumed that success can be measured.
- 3) It is assumed that relative success can be compared in terms of scores obtained on standardized norm-referenced tests.
- 4) It is assumed that readiness is measurable.
- 5) It is assumed that it is possible to identify students who have or have not attained a level of readiness.
- 6) It is assumed that the screening of the Ankeny students is accurate.

### Limitations of the study

Certain factors limit the findings of this study and are an important consideration when making judgments based on the findings.

- 1) The sample for the study was not random. All available student scores, for whom permission was given, have been included in the data collection.
- 2) The structure of the program in the Ankeny Schools is one of voluntary screening and participation. The vast majority of

students identified and recommended for inclusion in the program have participated.

- 3) There are not sufficient numbers of students recommended who did not participate in the program, therefore there is no true control group.
- 4) There exists, within the parameters of this study, the inability to show that the year of Developmental Kindergarten was the single factor allowing students to succeed.
- 5) This study represents involvement of one school district. The population involved was the students enrolled in the Ankeny Community School District.
- 6) Tests for reliability and validity of the screening instrument have not been established.

#### The district: Ankeny Community Schools

Ankeny is located in central Iowa, ten miles north of Des Moines. Ankeny Community Schools maintains programs for Developmental Kindergarten through twelfth grade and has accreditation by the North Central Association of Colleges and Schools. The district has an enrollment of 4,287 students and employs 255 professional staff. The 1991-1992 operating budget was \$15,726,000.

The configuration of the district consists of eight attendance centers. There are five elementary schools ranging in enrollment from 405 to 591 students. Four of the elementary schools house

Kindergarten through grade six. The other elementary attendance center houses Developmental Kindergarten through grade six for a total elementary student population of 2,529 during the 1991-1992 school year. The middle school, grades seven and eight, has been housed in the Parkview and Nevlan attendance centers while an addition to Parkview has been under construction. Beginning in the fall of 1992, all middle school students will attend Parkview and the Nevlan site will house the community education program. The high school houses grades nine through twelve and offers a comprehensive program including 155 courses. The high school facility includes a 3,500 seat field house, a 4,000 seat stadium, a 560 seat auditorium, outdoor tennis courts, an all-weather track, and an indoor recreational facility/swimming pool. The YMCA of Ankeny is housed on the grounds of the high school facility.

Students in the Ankeny Schools have an opportunity to be involved in a wide variety of activities which include elementary Thinking Cap teams, Knowledge Master Open team, and music groups. Seventy percent of Ankeny graduates enroll in some form of post-secondary education.

#### Definition of terms

A variety of terms have been used in this presentation which need to be defined or clarified.

Exterior programs: These programs allow an extra year of formal schooling that offers the opportunity for additional growth and

development in a structured educational environment. The term is most often used in conjunction with Developmental Kindergarten and Transitional First Grade. These programs do not repeat the kindergarten or first grade curricula. They are designed to provide developmental learning for the student who is deemed not ready to proceed with the traditional grade configuration.

Developmentally Appropriate Practices: The National Association for the Education of Young Children (1985), asserts that a developmentally appropriate curriculum centers around child-initiated exploration and play in a context that is interesting and relevant to children.

Standardized, Norm-Referenced Tests: Standardized tests are those tests which have resulted from careful and skillful preparation. They cover broad academic objectives common to a large number of school systems. These are tests for which comparative norms have been derived, their validity and reliability established, and directions for administering and scoring prescribed. Norm-referenced tests permit one to compare an individual's performance on the test to the performance of other individuals. An individual's performance is interpreted in terms of his or her relative position in a specified group, known as the normative group (Ary, 1990).

Iowa Test of Basic Skills (ITBS): The ITBS is a standardized, norm-referenced test battery. The ITBS batteries provide for the comprehensive measurement of growth in the skills of listening, word

analysis, vocabulary, reading, language, work-study and mathematics (Hieronymus, 1986). These tests are administered by the classroom teacher. They are machine scored and results reported by the University of Iowa Testing Service.

Cognitive Abilities Test (CAT): The CAT is a standardized, norm-referenced test battery. The CAT, primary battery, is designed to assess the development of cognitive abilities related to verbal, quantitative, and nonverbal reasoning and problem solving. The skills and competencies tested reflect the ability to comprehend oral English, follow directions, hold material in short-term memory, scan pictorial and figural stimuli to obtain either specific or general information, compare stimuli and detect similarities and differences in relative size, position, quantity, shape, and time, possession of a store of general information and verbal concepts, ability to classify, categorize, or order familiar objects, and the ability to use quantitative and spatial relationships and concepts (Thorndike, 1986). The test is administered by the classroom teacher. It is machine scored and results reported by the University of Iowa Testing Service.

## REVIEW OF LITERATURE

### Introduction

This project is designed to investigate the relationship of the test scores in grades one through five for students who have completed a year of Developmental Kindergarten to the district composite for all of the students in the Ankeny Community School District. The study was undertaken to investigate what evidence exists as to the benefits of the developmental kindergarten experience in relation to test scores during subsequent years of schooling. As has been discussed, the goals of America 2000 address the issues of children starting school ready to learn, graduation rates, and demonstration of competency in subject matter throughout the formal schooling experience (U.S. Dept. of Education, 1991). The Iowa Department of Education (1991) and the Iowa State Education Association (1991) have made recommendations concerning early childhood education and developmentally appropriate practices. In addition, the National Commission on Excellence in Education (1983) specifically recommended that "placement and grouping of students, as well as promotion and graduation policies, should be guided by academic progress of students and their instructional needs, rather than by rigid adherence to age" (p.30).

With these issues in mind, the following literature review is relevant to this study because it provides a summary of:

- 1) The concept of kindergarten programs and practices as they



relate to readiness and developmentally appropriate practices

2) Readiness testing and screening practices

3) Kindergarten, retention, and exterior programs.

### Definitions

Kindergarten The concept of kindergarten was first introduced in Germany in 1937 by Friedrich Froebel (Woodhill, 1988). His concept of kindergarten reflected two important curricular principles: 1) helping children understand the world by playing with small geographic objects with the guidance and encouragement of a teacher and 2) emphasizing a curricular approach that was specifically designed for the age group (Mayers, 1991).

The study, appraisal, and evaluation of kindergarten programs and practices continues and there currently seems to be opposing viewpoints concerning the primary function of early childhood education. The controversial issues center around kindergarten curriculum, developmentally appropriate practices, and testing for readiness.

Readiness Much of the literature addressed issues concerning readiness. There is discussion of testing and screening for readiness and curriculum appropriate for the child's readiness level. However, a true definition of the term is difficult to pinpoint. Generally speaking, the concept of readiness addresses a child's relative preparedness to profit from a specific curriculum (Meisels, 1989).

Webster's New Collegiate Dictionary (1973), defines readiness as:

1a: prepared mentally or physically for some experience or action, b: prepared for immediate use; 2a (1): willingly disposed, (2): likely to do something indicated, b: spontaneously prompt; 3: notably dexterous, adroit, or skilled; 4: immediately available;

Developmentally appropriate curriculum Throughout the literature there is general agreement that practices which are considered to be developmentally appropriate are child-centered, experiential, and include active involvement. Willard and Bredekamp (1990) define a developmentally appropriate curriculum as one that emphasizes child-initiated as opposed to teacher-dominated learning activities, small group as opposed to total group activities, integrated learning experiences as opposed to strict demarcations between subject areas and active learning and involvement with things, events and people as opposed to practice and drill. The National Association for the Education of Young Children (1985) contends that a developmentally appropriate curriculum centers around child-initiated exploration and play in a context that is interesting and relevant to children.

With these definitions in mind, an examination of the literature as it relates to the issues of testing and screening for readiness, and current practices in kindergarten retention and exterior programs reveals a variety of opinions.

### Readiness testing and screening practices

Kindergarten classrooms of today are very much like the academic environment of first grades in previous years (Uphoff & Gilmore, 1986). Teachers believe that their job is to insure that children are prepared for the academic rigors ahead (Shepard & Smith, 1985). Teachers, principals, and supervisors feel pressured by society to provide more advanced academic experiences (Hatch & Freeman, 1988). With these issues come the increased use of screening and testing of young children. The perceptions of the educators as to their role, and the question of accountability, have created an environment for the widespread use of assessment instruments to determine readiness.

The issue of "readiness" for the introduction of academic work in the primary grades is a term used widely, yet difficult to define. In the child development literature it has been associated with processes of maturation, in particular physical development (Katz, 1986). The idea of developmental "readiness" implies that children are required to "fit the curriculum" rather than the adaptation of curriculum to "fit the child". However, educational policies require kindergarten or school entrance screening in 33 percent of the 48 states involved in the study, "Mandating Early Childhood Entrance/Retention Assessment: Practices in the United States", by Cannella and Reiff (1989). A total of 23 states either have mandated entrance screening or a majority of school districts within these states use screening measures.

As various economic and social factors have interacted to widen the readiness gap between individual children as they enter school, methods such as testing to determine entrance and promotion have been mandated (Pipho, 1988). Legislated assessment of young children has become a major issue for early childhood professionals. Some believe that assessment is necessary so that children are not placed in inappropriate learning environments (Judy, 1986; Bennett, 1986). Others feel that testing is not only developmentally inappropriate, but may serve to escalate the curriculum (Shepard & Smith, 1988). Some researchers view admission/retention as a cause of curricular escalation in the primary grades.

Many professionals believe that developmentally inappropriate modifications to curriculum are being implemented as a result of inappropriate use of standardized testing. There is a feeling that there are presently no readiness or achievement tests accurate enough to perform the critical functions being asked of them. Further, since readiness tests generally do not have predictive validity, and since they are often used to place children in extra-year programs that do not have demonstrable efficacy, their use for predicting future school functioning should be halted (Meisels, 1989).

#### Kindergarten, retention, and exterior programs

Changes in kindergarten curriculum over the past two decades have caused a shift to an "academic" driven approach. This current

type of rigid curriculum is viewed by many professionals as less responsive to wide ranges in age and ability, and has caused many schools to look to retention and extra-year programs for children (Egertson, 1987). Bettye M. Caldwell, Donaghey Distinguished Professor of Education at the University of Arkansas, feels that, as educators, we do know that retention often means we are left with the same child a year later. It has been shown that the rate of development appears to be the same with, or without, retention (Peck, 1989). Caldwell feels that the establishment of an exterior program is preferable to retention at the kindergarten level. She admits that, although limited, research on transitional or developmental classes indicates that students in these programs perform better on standardized tests.

Repeating kindergarten is intended to be different from non-promotion at other grade levels (Shepard, 1989). Because it comes before academic failure it is meant to be a preventative treatment. Often children are selected for kindergarten retention because of immaturity rather than poor academic skills. Many believe that being held back at the kindergarten level does not carry with it the stigma associated with retention in later years. In a review of the literature on kindergarten retention in its several forms: transition classrooms before first grade, developmental kindergarten before kindergarten, and simply repeating of kindergarten, Shepard concludes that kindergarten retention and transition rooms are ineffective. Although a year older

than their new grade peers, transition children perform no better academically than transition-eligible children who went directly on to first grade. Children who spend an extra year before first grade are just as likely to end up at the bottom of their first or third grade class as unready children who did not participate in special placement.

In increasing numbers, school districts are adding an additional year at the outset of children's school careers, instituting extensive policies of kindergarten retention, and establishing pre-kindergarten "readiness" programs and pre-first grade "transition" programs for children deemed "not ready" for traditional school entry programs (Meisels, 1989). Meisels points to the use of readiness or achievement tests for the classification, retention, or promotion of students as qualifications of "high-stakes tests". Examples of tests which he believes have achieved the high-stakes status include the *Gesell School Readiness Test*, and the *Brigance K and 1 Screen*. Meisels feels that the empirical evidence available to support the accuracy of these tests in measuring readiness is lacking.

If present trends in the structure of the family continue, most children under five will spend the substantial portion of their early years in early childhood programs, most five and six-year olds will attend all-day kindergarten, and during elementary school they will attend before and after school care (Katz, 1987). Fifteen states and the District of Columbia fund some pre-kindergarten programs for

four-year-olds in public schools (Morado, 1985), and increasing numbers provide preschool education for the handicapped.

There appears to be a great deal of confusion among parents and teachers, administrators, and policy makers concerning the appropriate age and developmental level needed for success in the early grades in elementary school (Fitzgerald, Ronk, & Howe 1986). Traditionally, schools accepted all children who had attained the age of five by a given date.

#### Background of the Ankeny Developmental Kindergarten program

Dr. Corly (Dideriksen) Peterson, a professor in Child Development at Iowa State University, has worked with the Ankeny Community Schools in the development of, and screening for, the Developmental Kindergarten program since its inception in 1985. I interviewed Dr. Peterson in April of 1992 to obtain information on the background of the program, screening practices, and instruments.

In the early 1980s a phenomena began in the suburbs of Des Moines, Iowa. In one of the suburbs there was a growing concern over the perception that parents were voluntarily holding their children out of kindergarten for reasons such as the belief that their students were developmentally or chronologically "young". There was also concern as to the appropriateness of screening, based on the ABC due to its academic nature and on the Gesell, although developmental, was seen as subjective. Dr. Peterson was employed to assist in providing an

alternative program called Optional Kindergarten. It was her intent to insure that the exterior program not be a way to "bleed-off" kids in order to make kindergarten more academic and that the schools incorporate more developmentally appropriate practices in the overall school program. At about the same time another of the Des Moines suburb was experiencing a problem with 18-20 different people administering the *Gesell* to all students. The subjective nature of the screening instrument and the inservicing of screeners was a primary concern.

The study of the developmental kindergarten program in the Ankeny Community Schools encompasses many of the issues addressed in the literature review. Children are screened to determine readiness. The child's results are profiled and a determination of readiness is attained. The student is then recommended for participation in the program to allow time for maturity and development in an organized school environment with a developmentally appropriate curriculum.

### Summary of literature

Kindergarten programs have experienced changes over the years. They have moved from an environment of socialization and constructive "play" to an academically driven curriculum. Current beliefs and trends are causing yet another shift to the developmentally appropriate curriculum characterized by a child-centered, activity-oriented, learning experience.



Testing and screening of young children to determine readiness, kindergarten entrance and grade promotion is prevalent and widespread. Yet there appears no conclusive evidence as to the validity or reliability of these practices. Additionally, there is little consensus as to the appropriateness of the testing for these purposes.

Finally, there appears to be little agreement nor conclusive evidence as to the benefits or positive and negative aspects to kindergarten retention or exterior programs. This study was designed to examine these issues in one Iowa school district.

## METHODOLOGY

### Introduction

The purpose of this chapter is to clarify the methods employed to study the research questions. The procedures which were followed and a summary of the methods used are described in this chapter.

### Overview

This study was designed to determine if a correlation exists between the groups of students who have participated in the Developmental Kindergarten program in the Ankeny Community Schools and their success in subsequent years of schooling, as measured by standardized norm-referenced tests, and to investigate what evidence exists as to the benefits of the developmental kindergarten experience. Test scores from the Iowa Test of Basic Skills and the Cognitive Abilities Test for students in grades one through five, who had completed a year of Developmental Kindergarten, were compared to the district composite for all of the students in the Ankeny Community School District.

The Iowa State University Committee on the Use of Human Subjects in Research reviewed this project. They concluded that the rights and welfare of the human subjects involved were adequately protected.

### Instrument Development

Iowa Test of Basic Skills and Cognitive Abilities Test The ITBS Batteries Manual for School Administrators states (1986), that all of the commonly used principles in the validation of test content have been applied in the preparation of individual test items. The behavioral objectives represented in the tests were determined through systematic consideration of courses of study, statements of authorities in method, and recommendations of national curriculum groups. The content of the tests has been very carefully selected to represent the best of curriculum practices and to reflect current emphasis upon excellence, social utility, and relevance for a diverse population. The arrangement of items into levels within each test follows specifications for placement and emphasis which make the tests for each level appropriate to a particular level of instruction and development. The items constituting the tests have been critically selected for cruciality and discriminating power from a much larger stock of original items on the basis of an extensive and representative try-out. For the construction of the first ten forms, more than 40,000 items were tried out and analyzed. The test for each skill was constructed to include a broad and representative sampling of the important situations in which that skill finds application. Reliability in the description of each individual student was an important consideration in constructing the tests. Each test was made long enough to provide a sound basis for diagnosing relative strengths and

weaknesses of individual students and assessing changes in performance from year to year.

Criterion-related validity is supported by reports of correlations between the Iowa Test of Basic Skills and the Cognitive Abilities Test (Buros 1989). Test reliabilities are high and interpretations are aided by good norms. There is reasonable evidence of content validity but users of the tests are encouraged to rely on their own, careful, item-by-item analysis of results to the correlation of test scores with district curriculum.

Ankeny Screening Instrument Dr. Peterson developed a new screening measure to determine a five-year-old child's developmental readiness level. The screening interview is derived from several measures including the *Santa Clara Developmental Profile*, the *Denver Developmental Screening Test*, the *Stanford-Binet Intelligence Scale*, the *Gesell Developmental*, and the *Marshalltown Behavioral Developmental Profile*. The screening interview consists of five subsections: Behavioral Checklist, Fine Motor, Memory-visual/auditory, Large Motor, and Language. The interview is administered by a trained interviewer and takes about 30 minutes to complete (Appendix A).

Dr. Peterson assists with the training of screening and in the interpretation of results. School personnel conduct the screening and it is their recommendation for student inclusion in the program. The child does not receive a composite score on the screening interview. Instead, the child's results in each subsection are plotted on the profile

sheet. A red line connects the child's results. A black line on the profile sheet illustrates the cut-off in each subsection for kindergarten readiness. Any child who is below the readiness line in three or more subsections is a possible candidate for developmental kindergarten. Information from the parent survey is also taken into consideration when making placement recommendations. In addition, there is an interviewer recommendation potential for "Special Referral". It is expressly the belief of Dr. Peterson and the Ankeny Community Schools, that the Developmental Kindergarten program is in no way a "Special Education" program. Conversely, if special needs are indicated, further testing and possible early staffing in the "regular special needs programs" is preferable (Appendix B).

After the screening measure has been conducted, the recording sheet completed, and the interviewer recommendation made, the parents receive a letter of explanation and a student profile. The parents then give consent for participation in the Developmental Kindergarten program. As was noted earlier the vast majority of parents support the program and enroll their students based upon the recommendation (Appendix C).

### Description of Treatment

In a brochure produced by Ankeny Schools entitled, *The Ankeny Developmental Kindergarten Experience*, it states that the Developmental Kindergarten is a program in the Ankeny Community

School District for children who are five years old but not ready to begin the regular kindergarten program. The children who participate do not have recognized learning problems but are in the program to give them time to mature and develop at their own pace. It is the goal of the program to create a developmentally appropriate, yet stimulating and organized environment. Duplication of activities in Developmental Kindergarten and Kindergarten is minimized to help insure that both settings will be new and exciting for the students. The Developmental Kindergarten classes have a smaller student-teacher ratio which creates a situation that meets the individual needs, interests, and abilities of the children. The educational content is segmented into social/emotional, physical/muscle coordination, and intellectual/language areas. All parents and families are an integral part of the Developmental Kindergarten experience. The main goals of the this program are as follows:

The program will:

- enhance the child's self-concept and provide positive experiences relating to school.
- allow the child opportunities to grow emotionally.
- provide for the development of social concepts and group experiences.
- teach responsibility and self-discipline.
- build large-muscle, fine-muscle, and eye-hand coordination.

- teach health and safety concepts.
- provide activities to enhance the child's language and listening skills.
- stress readiness skills for academic growth.

The goals stated recognize the child's ability for early learning, yet also recognize his or her need to learn through constructive play. Developmental Kindergarten strives to be the foundation for an enriching and successful school career. The Developmental Kindergarten as well as the Kindergarten classes are half-day sessions. The daily schedule includes an opening with calendar, weather, songs, and story activities. The students participate in large group table activities pertaining to unit topics/themes. Time allocated for *Peabody Language Development*, large muscle coordination activities, free-choice time with varying small groups and individual activities. Also incorporated in the schedule is a recess and snack time.

#### Method of Selecting Sample

The population identified for the study consists of those students in the Ankeny Community Schools' Developmental Kindergarten program between the years of 1985 (current fifth grade students) and 1989 (current first grade students). The enrollment during those years totals 198 students. Of the 198 students who initially participated in the program 18 remain enrolled at East Elementary School; 30 at

Terrace Elementary School; 36 at West Wood Elementary School; 13 at Northwest Elementary School; and 29 at Southeast Elementary School; for a total of 126 or 64 percent of the students currently enrolled in the Ankeny Community School District.

Letters were sent to parents of the 126 identified students. The correspondence explained the nature of the research and requested permission for use of student records by a return slip (Appendix D). Of the 126 students, slips were returned for 97, or 77 percent of the students. Of the 97 return slips, there were 6 that did not grant permission for inclusion of their student's records. The 91 students included in this study represent 94 percent of the slips granting permission and 72 percent of the potential 126 students identified as subjects for this research.

#### Data Collection

The data gathered include the grade equivalent score on the Iowa Test of Basic Skills in grades one through five, and the district mean grade equivalent for the concurrent grades and years, 1987-1991. Additionally, the standard deviation and variance of the Developmental Kindergarten cohort groups and the district composite have been computed.

Further, the National Percentile Rank (NPR) scores on the Iowa Test of Basic Skills in grades one through five, and the NPR scores on the Cognitive Abilities Test in grade two for the subjects have been



compiled. Also, the Ankeny Community School District total NPR composite on the Iowa Test of Basic Skills and Cognitive Abilities Test for the concurrent grades and years is included.

### Data Treatment

The source of data for the present research was the individual student scores on the Iowa Test of Basic Skills and the Cognitive Abilities Test for students who have completed the Developmental Kindergarten program in the Ankeny Community Schools. These scores, N=91, were analyzed in order to obtain a Developmental Kindergarten composite score. Also, the Ankeny District Composites for similar grade and year on each test was obtained.

The first analytic facet was to test for the significance of differences at the .05 level for the grade equivalent scores between the Developmental Kindergarten cohort groups and the district total population on the Iowa Test of Basic Skills.

The second analysis was to compare the mean of the National Percentile Rank between the Developmental Kindergarten cohort groups and the district totals on the Iowa Test of Basic Skills and the Cognitive Abilities test. Examination of mean deviations for each grade and each year were addressed.

The third analysis was to involve the analysis of Developmental Kindergarten student National Percentile Rank scores which occurred

equal to, above, or below the district mean on the Iowa Test of Basic Skills and the Cognitive Abilities Test.

To supplement the analysis of the individual grade and year comparisons, discussion of all groups at grade one (N=91), at grade two (n=69), at grade three (n=48), at grade four (n=31), and at grade five (n=14), on the Iowa Test of Basic Skills took place. Through this aspect of the study, the establishment of any trends were examined. Also, the issues of student age and gender have been addressed in the presentation of results.

## RESULTS

### Population

The population identified for the study consisted of students enrolled in the Ankeny Community Schools' Developmental Kindergarten program between the years of 1985 and 1989. The enrollment during those years totaled 198 students. Of the 198 students who initially participated in the program, 126 (64%) students were enrolled in the Ankeny Community Schools at the time of this study. Parental response was received from 97 (77%) identified students, with 91 (72%) parents granting permission to use of their child's scores.

The sample represented in this study is comprised of the 91 students for whom permission was received. These students have completed one year in the Developmental Kindergarten program, and have been continually enrolled in the Ankeny Community School System. The compiled scores for the sample represent students in grade levels one through five.

Two characteristics of this sample, gender and age, can be noted. The first is that the number of males are predominant over the number of females among the 91 students (Table 1). The independent variable of gender, dominated by males (71%), could indicate an impact on the dependent variable of differences in scores. These data, disaggregated by gender, will be addressed at a later point.

Table 1. Number of Developmental Kindergarten students by grade and gender

D.K. Class	Grade	Number	Males	Females
1985	5	14	10	4
1986	4	17	14	3
1987	3	17	10	7
1988	2	21	15	6
1989	1	22	16	6
Totals		91	65	26

Another independent variable in the study is that of age. Iowa law requires a child to have reached the age of five on or before September 15th in order to qualify for Kindergarten enrollment. The students enrolled in the Developmental Kindergarten program had met this age qualification, yet spent an additional year in a formal school setting prior to entering Kindergarten. Although the Developmental Kindergarten students are then older than their grade level peers, it is noted that a majority or 54 percent have birthdays during the months of July, August, and September, or the final quarter of the year in which they turned five and met the September 15th cut-off date. Seventy of the students or 77 percent have birthdays between May 15 and September 15, or the final third of the qualifying year (Table 2).

Table 2. Number of students turning age five by month, Iowa cut-off date to qualify for Kindergarten enrollment: September 15

September	16	May	9
August	14	April	8
July	19	March	4
June	13	All Others	8

### Instrument validity and reliability

Iowa Test of Basic Skills and Cognitive Abilities Test The Manual for School Administrators, ITBS Batteries (1986) states that all of the commonly used principles in the validation of test content have been applied in the preparation of individual test items. The content of the tests has been very carefully selected and the arrangement of items into levels within each test follows specifications for placement and emphasis which make the tests for each level appropriate to a particular level of instruction and development. The items constituting the tests have been critically selected from a much larger bank of original items on the basis of an extensive and representative try-out. For the construction of the first ten forms, more than 40,000 items were piloted and analyzed. The test for each skill was constructed to include a broad, representative sampling of the important situations in which that skill finds application. Reliability was an important consideration in constructing the tests.

Criterion-related validity is supported by reports of correlations between the Iowa Test of Basic Skills and the Cognitive Abilities Test.

Test reliabilities are high, with reliability coefficients for the Verbal, Quantitative, and Non-Verbal batteries clustered around the low .90's. The internal reliability range is .94 to .82 (Buros 1989).

Ankeny Screening Instruments Dr. Corly (Dideriksen) Peterson developed a screening measure to determine a five-year-old child's developmental readiness level. There has been no formal reliability or validity established for this screening instrument, which was used for recommendations to participate in the Ankeny Community School's Developmental Kindergarten program.

A screening interview was derived from several measures, including the *Santa Clara Developmental Profile*, the *Denver Developmental Screening Test*, the *Stanford-Binet Intelligence Scale*, the *Gesell Developmental*, and the *Marshalltown Behavioral Developmental Profile*. The screening interview consists of five subsections: Behavioral Checklist, Fine Motor, Memory-Visual/Auditory, Large Motor, and Language.

#### Research questions and analysis of data

The examination of data focused on four questions. The analysis of the data will be presented in conjunction with the questions along with tables and figures displaying the relevant information. For research questions two, three, and four, scores on the Iowa Test of Basic Skills will be presented first. After those results are discussed, data from the Cognitive Abilities Test will be addressed.

Question 1: Is there a significant difference at the .05 level between the grade equivalent of the Developmental Kindergarten (D.K.) cohort groups (the sample) and the general population of the Ankeny District on the Iowa Test of Basic Skills composite score, using the national grade equivalent score?

In Table 3 grade equivalent scores are reported as whole numbers. The first digit is the grade and the second digit represents the month. For example, 38 is the numerical representation for the eighth month of the third grade.

When using a t-test for significance of difference, a t-value of 1.96 is required for a non-directional (two-tailed) test to indicate a significant difference at the .05 level.

Examination of the grade equivalent scores for each student from the Developmental Kindergarten cohorts of 1985 through 1989, provides information about the estimated mean, estimated standard deviation, and estimated variance which can be defined. These data were compared to the District mean, standard deviation, and variance for concurrent grades and years. A t-value was attained through the statistical comparison. One can observe that there is no significant difference at the .05 level in fourteen of the fifteen cohort groups. The D.K. cohort class of 1986, when compared to the District population results in a t-value of 2. This value indicates a significant difference, the D.K. cohort having scored higher than the District composite in grade one on the Iowa Test of Basic Skills.

Table 3. National grade equivalent scores, means, standard deviations, variance, and t-value for the Iowa Test of Basic Skills

D.K. '85	GRADE ONE	GRADE TWO	GRADE THREE	GRADE FOUR	GRADE FIVE
	31	41	55	68	81
	25	38	55	64	78
	23	38	55	64	78
	20	37	53	62	71
	19	33	49	61	71
	19	31	45	60	69
	17	24	42	57	69
	16	24	40	47	63
	16	22	36	44	53
	15	20	33	41	51
	14	20	30	40	48
	13	17	26	40	48
	12	17	22	40	48
	12	15	19	37	40
D.K. MEAN	18	26.9286	40	51.7857	62
STD.DEV.	5.40655	9.09323	12.6491	11.3692	13.60995
VARIANCE	29.2308	82.6868	160	129.258	185.2308
N=	14	14	14	14	14
DIST.MEAN	16.7128	28.08	39.9327	51.5256	62.5266
STD.DEV.	6.2304	7.6762	9.1721	9.3092	10.6454
VARIANCE	38.8176	58.9233	84.1273	86.6617	113.3255
N=	282	300	312	312	319
t-VALUE =*	0.76**	0.54**	0.03**	0.1**	0.18**

\* Level of significance for a non-directional (two-tailed) test at the .05 level, t-value=1.96

\*\*No significant difference between Developmental Kindergarten cohort and District



Table 3. (Continued)

D.K. '86	GRADE ONE	GRADE TWO	GRADE THREE	GRADE FOUR
	29	41	55	68
	26	41	53	64
	25	41	49	64
	25	37	47	59
	22	31	46	58
	21	30	44	57
	20	30	44	56
	18	30	42	56
	17	29	41	54
	17	28	41	54
	15	28	39	53
	14	27	37	53
	14	26	36	52
	13	25	36	51
	12	25	36	50
	10	25	35	41
	8	22	31	40
D.K. MEAN	18	30.3529	41.8824	54.7059
STD. DEV.	6.0208	6.04091	6.62271	7.25228
VARIANCE	36.25	36.4926	43.8603	52.5956
N=	17	17	17	17
DIST. MEAN	15.1848	28.4766	40.1796	51.7649
STD.DEV.	5.6536	7.4511	8.7911	9.4926
VARIANCE	31.9627	55.519	77.2829	90.1087
N=	330	321	334	336
t-VALUE =*	2***	1.02**	1.11**	1.26**

\* Level of significance for a non-directional (two-tailed) test at the .05 level, t-value=1.96

\*\* No significant difference between Developmental Kindergarten cohort and District

\*\*\*t-value of 2 indicates a significant difference at the .05 level

Table 3. (Continued)

Table 3. (Continued)

D.K. '87	GRADE ONE	GRADE TWO	GRADE THREE
	25	35	51
	23	34	51
	20	34	51
	20	33	46
	17	30	42
	17	28	41
	16	28	39
	16	28	39
	15	28	38
	15	27	38
	14	25	36
	13	25	34
	13	24	30
	13	22	28
	11	20	28
	10	20	27
	7	20	27
D.K. MEAN	15.5882	27.1176	38
STD. DEV.	4.58338	4.99853	8.38153
VARIANCE	21.0074	24.9853	70.25
N=	17	17	17
DIST. MEAN	16.6099	28.4766	39.9327
STD. DEV.	6.1309	7.4511	9.1721
VARIANCE	37.5884	55.519	84.1273
N=	364	321	312
t-VALUE =*	0.68**	0.74**	0.85**

\* Level of significance for a non-directional (two-tailed) test at the .05 level, t-value=1.96

\*\* No significant difference between Developmental Kindergarten cohort and District

Table 3. (Continued)

D.K. '88	GRADE ONE	GRADE TWO	D.K.'89	GRADE ONE
	31	38		27
	31	35		24
	22	33		24
	21	33		24
	20	32		23
	20	31		20
	20	31		20
	19	29		19
	19	28		19
	19	28		19
	19	28		17
	18	26		16
	17	25		15
	17	25		15
	16	24		13
	15	24		11
	14	22		11
	14	21		11
	12	20		11
	11	18		10
	10			9
				9
D.K. MEAN	18.3333	27.55		16.6818
STD. DEV.	5.35101	5.29623		5.5924
VARIANCE	28.6333	28.05		31.2749
N=	21	20		22
DIST. MEAN	17.2773	28.7753		16.9888
STD.DEV.	6.1706	6.7336		6.0312
VARIANCE	38.076	45.3409		36.3752
N=	321	356		358
t-VALUE =*	0.76**	0.8**		0.23**

\* Level of significance for a non-directional (two-tailed) test at the .05 level, t-value=1.96

\*\* No significant difference between Developmental Kindergarten cohort and District

Question 2: How does the mean score of the National Percentile Rank (NPR) on the Iowa Test of Basic Skills and the Cognitive Abilities Test differ between the Developmental Kindergarten (D.K.) cohort groups and the overall Ankeny student population?

Scores on the Iowa Test of Basic Skills and the Cognitive Abilities Test are reported as whole numbers which represent the National Percentile Rank. The scores range from 99 to 1, indicating where a student scored relative to other students nationally at the same grade. For example, a score of 75 indicates that the student scored equal to, or higher than, 75 percent of the students nation-wide who took the same test.

In Table 4 analysis of the data shows the D.K. cohorts' National Percentile Rank scores and the Ankeny District National Percentile Rank composite scores on the Iowa Test of Basic Skills. Examination of the scores of each D.K. class at grade levels one through five, displays a composite score for the class which was compared to the District composite for the same years and grades. By comparing the composite, or mean scores, of the D.K. cohorts and the District, a mean deviation score was computed.

The Developmental Kindergarten class of 1985 was compared to the District composite scores in grade levels one through five (1987-1991). The results shows mean deviations of +2, -13, -11, -7, and -9. It is noted that the cohort initially scored slightly higher than the District average, then dropped considerably before gradually approaching the District mean in grades four and five.

The Developmental Kindergarten class of 1986 was compared to the District means. In grade levels one through four (1988-1991) this group attained mean deviations of +6, +1, 0, and +3. These data indicate the same trend as with the previous cohort comparison.

Table 4. National Percentile Rank scores on the Iowa Test of Basic Skills for the District and the Developmental Kindergarten cohort classes: 1985-1989

D.K. '85	GRADE ONE	GRADE TWO	GRADE THREE	GRADE FOUR	GRADE FIVE	D.K. 86	GRADE ONE	GRADE TWO	GRADE THREE	GRADE FOUR
	99	99	99	99	99		98	99	99	99
	94	97	99	97	98		96	99	98	97
	90	97	99	97	98		95	99	96	97
	82	96	98	96	93		95	96	93	93
	78	89	96	95	93		89	85	92	92
	78	85	90	94	91		86	82	88	91
	74	60	84	91	91		83	82	88	89
	70	60	79	67	80		77	82	84	89
	70	50	67	58	54		74	79	82	85
	66	40	55	47	49		74	76	82	85
	61	40	43	44	40		65	76	76	83
	56	27	28	44	40		60	72	70	83
	51	27	14	44	40		59	68	67	81
	51	19	6	34	19		54	64	67	78
							49	64	67	75
							39	63	63	47
							29	50	47	44
D.K. MEAN	73	63	68	72	70		72	79	80	83
D.K. N=	14	14	14	14	14		17	17	17	17
DIS.MEAN	71	76	79	79	79		66	78	80	80
DIST. N=	282	300	312	312	319		330	321	334	336
MEAN DEV.	+2	-13	-11	-7	-9		+6	+1	0	+3

Table 4 (continued)

D.K. '87	GRADE ONE	GRADE TWO	GRADE THREE	D.K. 88	GRADE ONE	GRADE TWO	D.K. 89	GRADE ONE
	95	93	97		99	97		97
	91	91	97		99	93		93
	83	91	97		89	89		93
	83	89	92		86	89		93
	74	82	84		83	87		91
	74	76	82		83	85		83
	70	76	76		83	85		83
	70	76	76		80	79		80
	65	76	73		80	76		80
	65	72	73		80	76		80
	59	64	67		80	76		74
	54	64	59		77	68		70
	54	60	43		74	64		65
	54	50	35		74	64		65
	44	40	35		70	60		54
	39	40	31		65	60		44
	24	40	31		59	50		44
					59	45		44
					49	40		44
					44	31		39
					39			34
								34
D.K.MEAN.	65	69	68		74	71		67
D.K. N=	17	17	17		21	20		22
DIS.MEAN	72	79	78		66	77		74
DIST.N=	364	321	312		321	356		358
MEAN DEV.	- 7	-10	-10		+8	- 6		- 7

Initially the cohort scores were higher than the District composite, then they dropped. The Developmental Kindergarten class of 1986, however, never drops below the District mean score for any grade levels one through four.

The Developmental Kindergarten class of 1987 when compared to the District in grade levels one through three (1989-1991) reflect

mean deviations of -7, -10, and -10. It is noted that this cohort did not follow the trend of initially scoring above the district mean. However, the results of the first year of testing did show a higher mean than the second and third years, as was the case for the previous cohort groups.

The Developmental Kindergarten class of 1988 and the District composites for grade levels one and two (1990-1991) have mean deviations of +8 and -6. The '88 cohort, as with the '85 and '86, scored above the District average at the first grade and then dropped in the second year of testing.

The Developmental Kindergarten class of 1989, when compared with the District composite in grade one (1991), represents a mean deviation of -7. This cohort, as with the class of 1987, scored below the District average in the first year of testing.

Question 3: What is the range of percentile rankings for the Developmental Kindergarten cohort groups on the Iowa Test of Basic Skills and the Cognitive Abilities Test.

The characteristic examined here is the range of scores on the Iowa Test of Basic Skills. As was previously noted, percentile rankings have a potential range of 99 to 1. The analysis focuses on the cohort group range for each year. As one inspected Table 4, it was noted that the high end of the range for each cohort on each test was above the 90th percentile (93 to 99). The low end of the range varied considerably from the 6th percentile to the 51st percentile.

Question 4: What percentage of the Developmental Kindergarten students scored above, equal to, and by comparison, below, the District

means on the Iowa Test of Basic Skills and the Cognitive Abilities Test?

The data analyzed by cohort group for this question was the percentage of D.K. students that scored above the district average on the Iowa Test of Basic Skills. Figure 1 shows that the 1985 class at grade one with 50% of the students scoring above the District composite. In grade two, 43% scored above the District average; in grade three, 57%; in grade four, 50%; and in grade five 57% of the students scored above the District mean. The 1986 class indicates 59%, 53%, 59%, and 76% scoring above the District average during grades one through four respectively. The 1987 class shows 35%, 29%, and 35% of the students scoring above the District mean in grades one through three. The 1988 class had 71% in grade one and 38% in grade two score above the District average, and the 1989 class had 45% of the students score higher than the District average. This indicates that nine of the fifteen cohort groups had 50% or more of the students who scored above the District average. Further study of the scores shows a definite majority, or 81% of the total number of scores recorded (252) by the Developmental Kindergarten students, to be higher than the National Percentile Rank of 50.



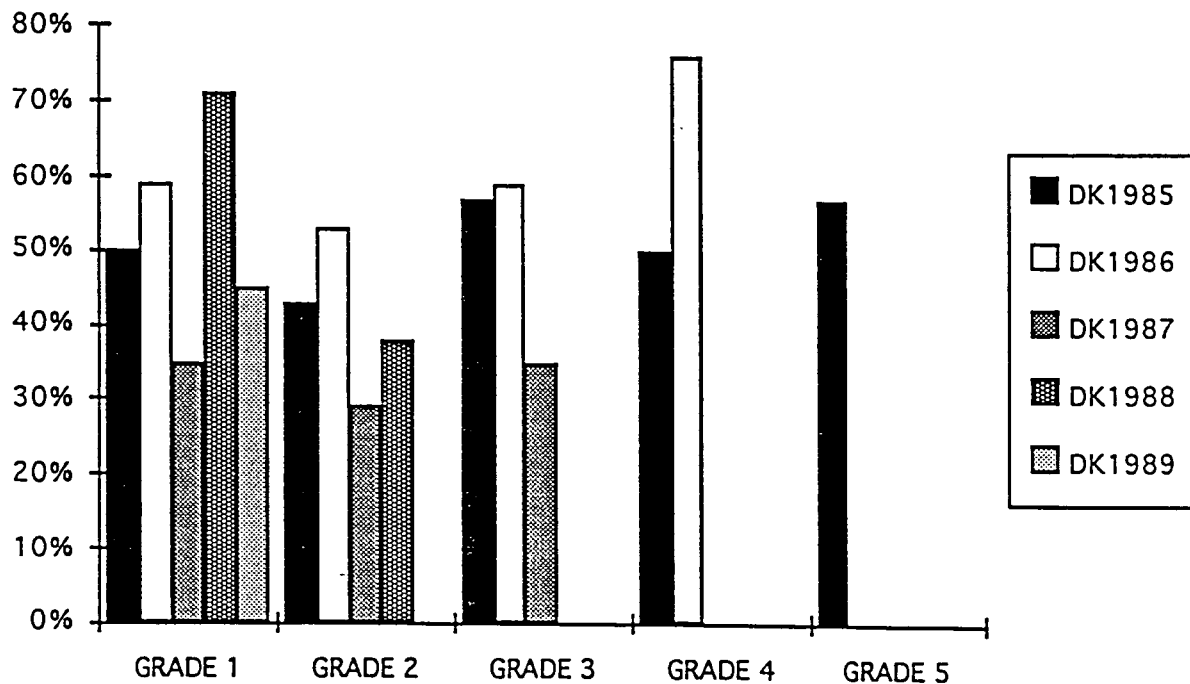


Figure 1. Percentage of Developmental Kindergarten students scoring above the district average in grades one through five.

During second grade the students were examined on the Cognitive Abilities Test (CAT) in the areas of Verbal, Quantitative, and Non-Verbal components. Examination of Table 5 shows data which addresses research questions two, three, and four in reference to the Cognitive Abilities Test.

As students in the Developmental Kindergarten classes of 1985 through 1988 reached grade two they achieved the scores shown in rank order. In grade two during 1988, on the Cognitive Abilities Test, the

Table 5. National percentile scores, means, and mean deviations on Cognitive Abilities Test components of Verbal, Quantitative, and Non-verbal

	'88 VERB	QUAN	NON VERB	'89 VERB	QUAN	NON VERB	'90 VERB	QUAN	NON VERB	'91 VERB	QUAN	NON VERB
	97	99	98	99	97	93	87	97	98	87	99	96
	91	97	96	87	97	92	84	95	96	84	98	94
	91	97	94	87	97	87	84	79	91	84	98	91
	89	97	93	87	95	84	80	79	91	80	98	84
	80	81	91	87	94	81	80	79	81	80	93	84
	76	75	81	84	91	70	80	75	78	76	93	84
	76	70	74	84	88	70	76	70	74	71	91	83
	76	65	49	84	81	68	76	70	68	71	79	81
	66	65	45	76	81	63	76	70	55	71	76	74
	58	61	27	71	79	49	71	65	49	66	75	70
	44	52	25	71	79	45	58	61	41	63	75	63
	44	52	18	71	72	36	58	56	41	58	72	63
	40	25	16	52	70	32	52	52	33	58	61	49
	19	13	12	40	56	27	52	44	22	58	61	45
				40	56	18	52	44	22	58	61	45
							40	40	10	52	61	41
							40	36	7	44	56	36
										40	52	36
										35	52	30
										29	23	12
D.K.	68	68	59	75	82	61	67	65	56	61	71	60
DIST.	66	70	60	72	74	65	70	72	67	69	73	65
DEV.	+2	-2	-1	+3	+8	-4	-3	-7	-11	-8	-2	-5

Developmental Kindergarten composite scores for Verbal, Quantitative, and Non-Verbal when compared to the District average indicate mean deviations of +2, -2, -1. The range of National Percentile Rank was 99 to 19, 99 to 13, and 98 to 12 for each component respectively. A count of the students scoring above the District composites shows 64%

scoring above the District average on the Verbal, and 50% scoring above on the Quantitative and Non-Verbal components.

In 1989 the cohort composite on the Cognitive Abilities Test components compares to the District averages to show mean deviations of +3, +8, and -4. The ranked scores indicate that 53%, 65%, and 47% of the students scored higher than the District composite on each component of the test.

In 1990 the cohort composite when compared to the District means represent a mean deviations of -3, -7, and -11. There were 59%, 35%, and 47% of the students scoring above the District composite for each component on the Cognitive Abilities Test.

The 1991 cohort scores compared to the District composites reflect mean deviations of -8, -2, and -5. The ranked scores show 43%, 52%, and 48% scoring higher than the District composite for each component.

The next analytic facet, which supplements the composite comparisons, involves the examination of student scores on the Iowa Test of Basic Skills for all students completing the Developmental Kindergarten program at grade one, two, three, and four. (Only one cohort has reached grade five at the time of this study, therefore those comparisons have already been addressed). Analysis of the scores for all students in each grade displayed by frequency for each 10th percentile rank (Figure 2), indicates that most of the D.K. scores are above the national average (National Percentile Rank of 50).

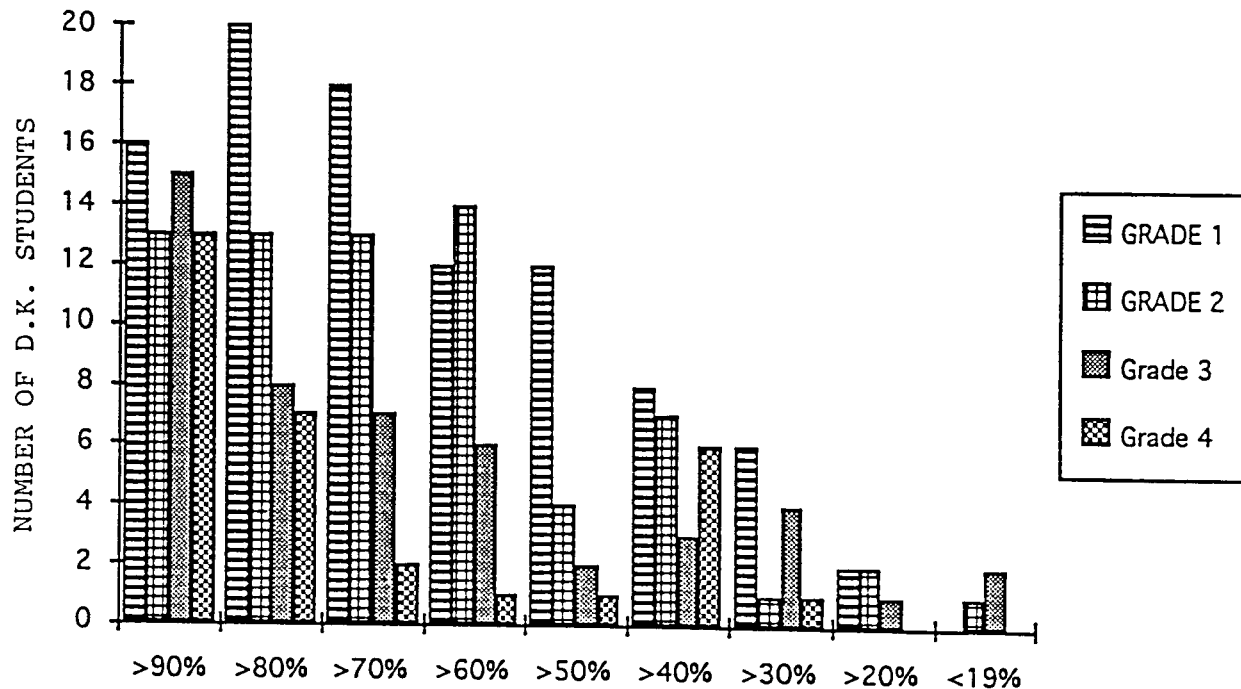


Figure 2. Number of D.K. students by percentile score on the Iowa Test of Basic Skills

For all Developmental Kindergarten students at grade one, N=91, the composite National Percentile Rank score on the ITBS was 73. The District average for the same years was 70, which represents a mean deviation of +3. The range for the cohort students was 99 to 24, with 59% of the scores higher than the District average.

The Developmental Kindergarten students at grade two, N=69, scored a National Percentile Rank composite of 71 on the Iowa Test of Basic Skills. The District average was 78 which represents a mean

deviation of -7 with 41% of the student scores above the District average. The range at grade two was 99 to 19.

The Developmental Kindergarten students at grade three, N=48, scored a composite of 72. The District average was 79 which indicates a mean deviation of -7, with 50% of the Developmental Kindergarten scores equal to or higher than the District average. The range at grade three was 99 to 6.

The Developmental Kindergarten students at grade four, N=31, achieved a composite of 78. The District average was 80 for a mean deviation of -2, with 65% scoring higher than the District average. The range at grade four is 99 to 34.

The Cognitive Abilities Test scores for all Developmental Kindergarten students at second grade were 67 on Verbal, 72 for Quantitative, and 59 on the Non-Verbal component. When compared with District averages this represents a mean deviation of -2, 0, and -5 respectively. On each component 57%, 51%, and 49% of the students scored higher than the District average.

Examination of Figure 3 shows the number of students scoring in each percentile for each component of the Cognitive Abilities Test. The scores on the Verbal and Quantitative components indicated a positive skew, while the Non-Verbal component did not

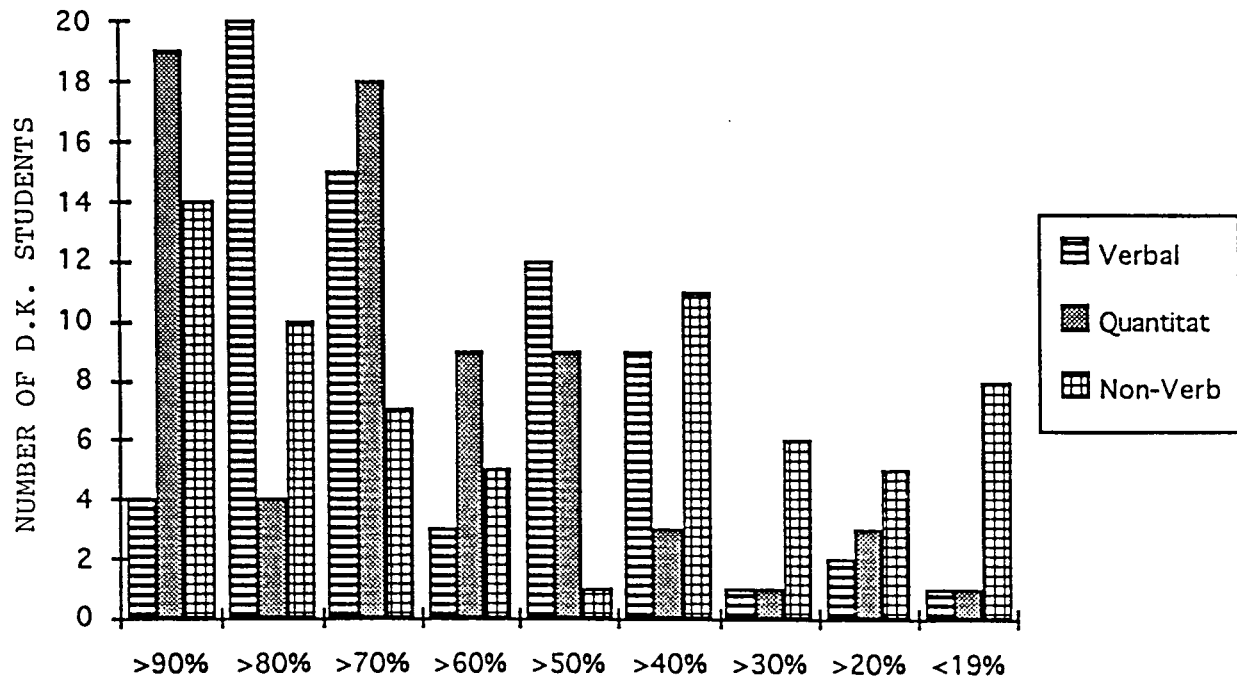


Figure 3. Number of D.K. student scores by percentile rank on the Cognitive Abilities Test

Figure 4 shows the examination of the comparisons of the mean scores on the Iowa Test of Basic Skills at each grade. These data indicate that the Developmental Kindergarten students scores only slightly higher at grade one. In grades two, three, four, and five the District mean rises above the Developmental Kindergarten average with data from grade four showing the smallest difference.

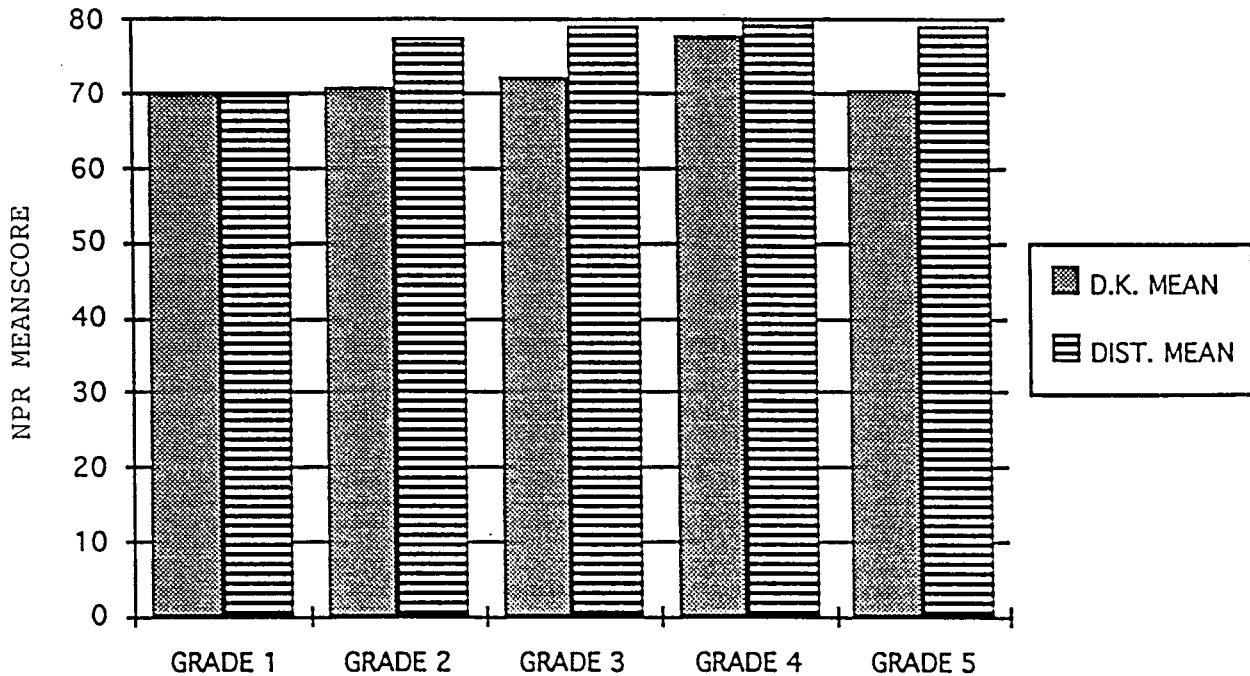


Figure 4. Comparison of NPR mean scores for D.K. and the District on the Iowa Test of Basic Skills

The line graph in Figure 5 shows the Developmental Kindergarten and District mean scores at each grade. This representation depicts the pattern of a diverging and converging trend.

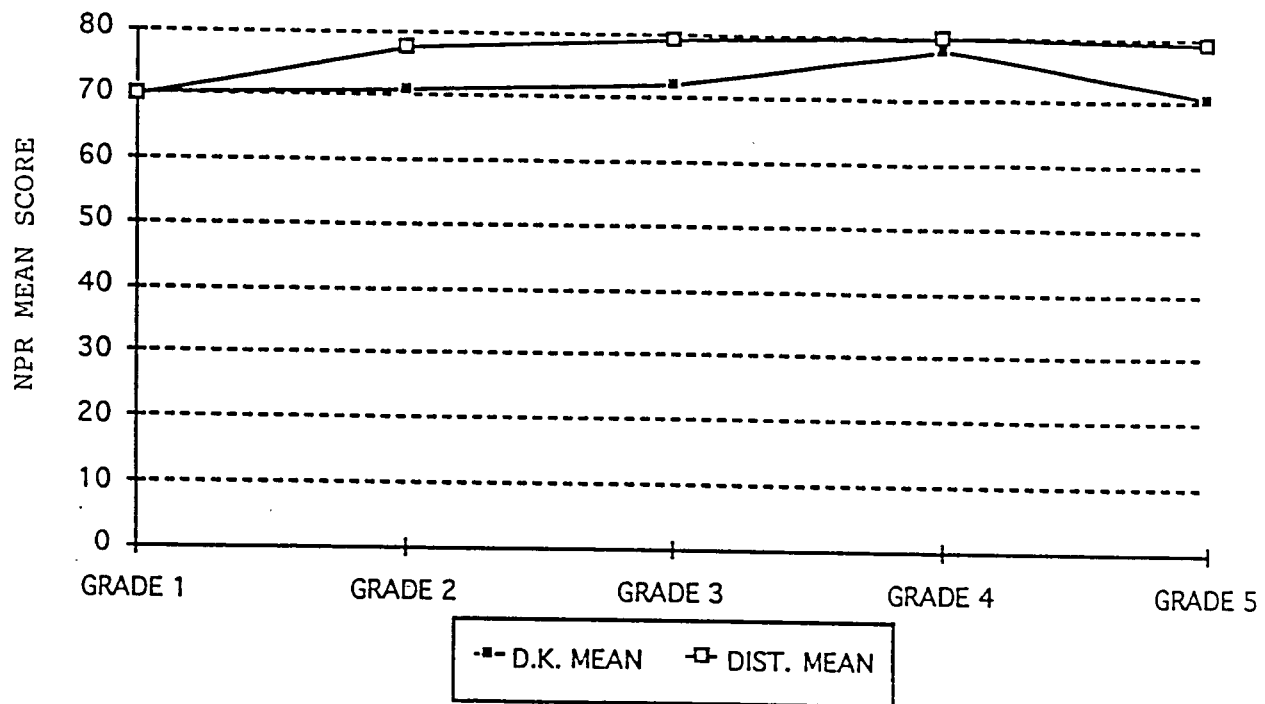


Figure 5. NPR mean scores on the Iowa Test of Basic Skills

Figure 6 shows the D.K. scores disaggregated by gender. As was indicated previously, the independent variable of gender is addressed to indicate a minimal chance of the influence on scores. Although the number of Developmental Kindergarten male students predominated in numbers (71% compared to 29%), the scores of the males and females were comparable at grades one, three, and five. The males scored slightly lower in grade two, and substantially higher in grade four than did the females. The differences between males and females on the Cognitive Abilities Test is slight.



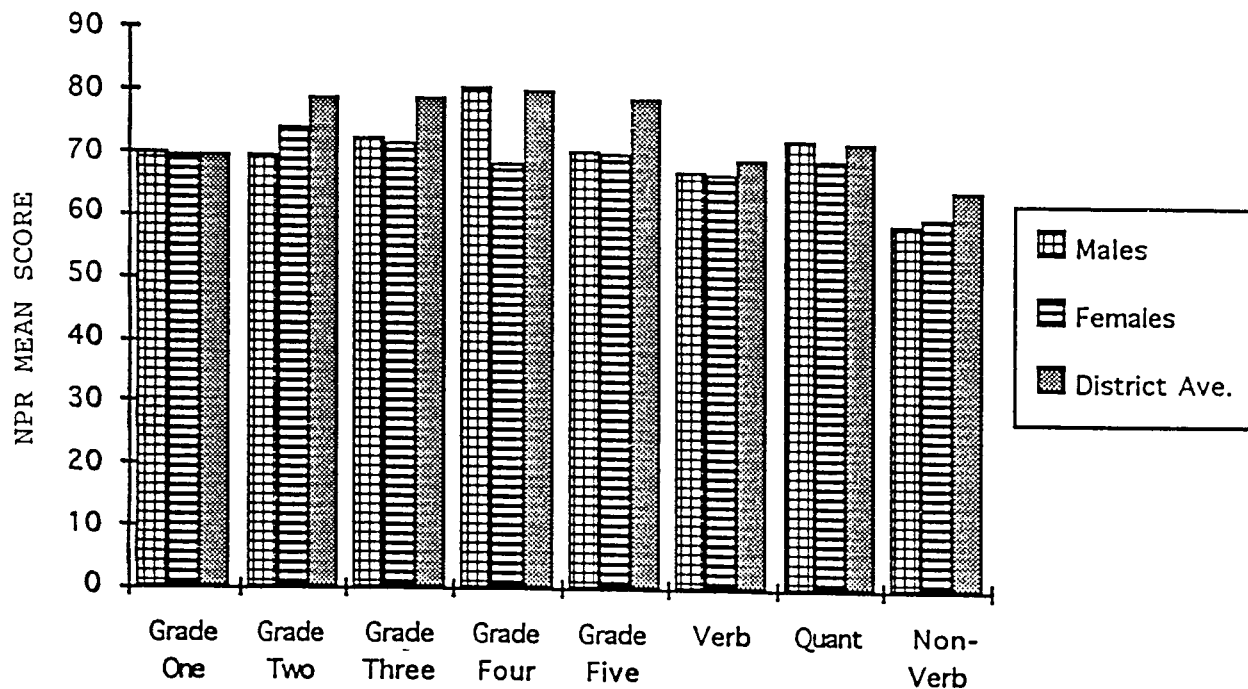


Figure 6. Developmental Kindergarten NPR scores disaggregated by gender on the Iowa Test of Basic Skills and Cognitive Abilities Test

### Summary

In this chapter the compilation of data has been presented. Discussion of the population and the sample have been addressed to include identification, selection, and the characteristics of gender and age. Information concerning instrument validity and reliability have been included. The four research questions have been addressed regarding test scores on the Iowa Test of Basic Skills and the Cognitive Abilities Test. In the interest of clarity, scores on the different kinds of tests were addressed separately. Additionally, the data were

supplemented with a presentation of results compiled and analyzed by grade level. Finally, the grade level scores were disaggregated by gender.

## DISCUSSION

### Introduction

With an increasing awareness of, and concern for, early childhood education and developmentally appropriate practices for all children, school districts must look to research and study their current practices to ascertain indicators of success as well as to focus on areas which may need attention. This writer investigated data from the Developmental Kindergarten program in the Ankeny Community Schools.

This project was designed to investigate the relationship of the test scores in grades one through five for students who have completed a year of Developmental Kindergarten to the district composite for all of the students in the Ankeny Community School District during concurrent years and grades. The study was undertaken to determine if a correlation exists between students who have participated in the Developmental Kindergarten program and their success in subsequent years of schooling, as measured by standardized norm-referenced tests.

The results of this study may have implications for the value of exterior programs for those students who are chronologically five years of age by September 15th, but yet are identified as having developmental deficiencies which may limit their success.

Review of study limitations

Certain factors limit the findings of this study and are an important consideration when making judgements based on the findings.

- 1) The sample for the study was not random. All available students scores, for whom permission was given, have been included in the data collection.
- 2) The structure of the program in the Ankeny Schools is one of voluntary screening and participation. The vast majority of students identified and recommended for inclusion in the program have participated.
- 3) There are not sufficient numbers of students recommended who did not participate in the program, therefore there is no true control group.
- 4) Within the parameters of this study the inability to show that the year of Developmental Kindergarten was the single factor allowing students to succeed exists.
- 5) This study represents involvement of one school district. The students involved were enrolled in the Ankeny Community School District.
- 6) Tests for reliability and validity of the screening instrument have not been established.

Acknowledgement of these factors, which limit the scope and implication of the findings, have been considered in making judgements based on the results of the study.

#### Discussion of the findings

The data presented show that the Developmental Kindergarten cohort groups did not score significantly different than the district average grade equivalent on the Iowa Test of Basic Skills during fourteen of the fifteen testing sessions. The one cohort group that exhibited a significant difference, scored higher than the district mean. If it is assumed that the screening of the students was accurate, in that the identified students initially exhibited developmental deficiencies, one may draw the conclusion that the additional year of developmental preparation enabled students to attain this success.

Further, the data show that the range of percentile scores on the Iowa Test of Basic Skills represent a positively skewed distribution. Although the scores range from 99 NPR to 6 NPR, the majority fall above the fiftieth percentile. Additionally, the range of percentile scores on the Cognitive Abilities Test represent a positively skewed distribution on the verbal and quantitative components. On the non-verbal component the data do not indicate a positive or negative skewness.

Finally, the data show that the vast majority of students who were identified as being developmentally delayed at the kindergarten

entry age of five, score higher than 50 percent of the students nationally on the Iowa Test of Basic Skills and on the Cognitive Abilities Test after completing a year in the Developmental Kindergarten program. Further, 41 to 65 percent of the Developmental Kindergarten students scored higher than district averages for their respective grade on these standardized tests.

#### Recommendations for further study

This study has implications for further research. Those areas which may potentially be explored include:

- 1) Aspects of the social and emotional consequences of Developmental Kindergarten on the students in subsequent years of schooling, as well as investigation as to the effects on their self-esteem.
- 2) School involvement and attendance of these students as an indicator of success.
- 3) Parent, teacher, and administrator attitudes toward the students and this type of program could provide information about the benefits or detriments of an exterior program.
- 4) By continuing to follow these students during future years of their formal schooling, one could indicate whether or not the data remains much the same as students mature.
- 5) A study of the specific areas identified through screening as developmentally delayed and correlations with success in

subsequent years of schooling could be investigated.

- 6) Development of validity and reliability measures for the screening instrument.

### Summary

The review of literature showed that current beliefs and trends are causing a shift to the developmentally appropriate curriculum characterized by a child-centered, activity-oriented, learning experience. Testing and screening of young children to determine readiness, kindergarten entrance and grade promotion is prevalent and wide-spread. Yet there appears no conclusive evidence as to the validity or reliability of these practices. Additionally, there is little consensus as to the appropriateness of the testing for these purposes. Further, there appears to be little agreement nor conclusive evidence as to the benefits or positive and negative aspects to kindergarten retention or exterior programs. This study was designed to examine these issues in one Iowa school district.

The writer reviewed test scores as an indicator of success for students from 1987 through 1991 who had participated in an exterior program in the Ankeny Community Schools between the years of 1985 and 1989. The stated purpose was to investigate the relationship of test scores between the Developmental Kindergarten cohort groups and the overall student population during concurrent grades and years. This investigation was done to determine if a correlation exists between

participation in the program and student's success in subsequent years of schooling, as measured by these standardized norm-referenced tests, the Iowa Test of Basic Skills and the Cognitive Abilities Test.

The findings indicate that the majority of students in the Developmental Kindergarten cohort groups have attained success as measured by the standardized norm-referenced test scores contained in this study. With the potential of difficulties or retention at the primary levels which may have caused social and emotional trauma for the student and his or her family, the Developmental Kindergarten program was a positive alternative. These data support the conclusion that the Developmental Kindergarten program did make a positive impact on the participating students. As a result of this program, students became part of the organized school structure at the age of five, in a setting designed to assist them regarding their developmental delays. Further, students acquired their peer group on the front end, rather than losing that group in a retention situation. The Developmental Kindergarten program allowed these students to be in a position to succeed. If the program had not been available, alternatives for these students included postponing the start of their formal education or entering kindergarten with developmental delays which may have set them up for failure as they continued their education.



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## ACKNOWLEDGMENTS

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Thank-you to the Ankeny Community School System for providing the inspiration, information, time, and support for this project: Dr. Ben Norman, Superintendent of Schools; Dr. Jackie Pelz, Director of Curriculum and Instruction; Mr. Randy McMahon, my mentor and principal at East Elementary School; Ms. Mary Brooks and the elementary secretaries; the other elementary principals; and the parents of the Developmental Kindergarten students who granted permission to use their child's records.

Sincere appreciation to the members of my committee: Dr. Shirley Stow, Dr. Richard Manatt, and Dr. Ray Dearin. In addition, thanks to Dr. Tony Netusil and all of the Iowa State University professors who encouraged and supported me in this endeavor. Also to Dr. Mike Szymczuk from Heartland Area Education Agency, who provided statistical information and suggestions vital to the project results.

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APPENDIX A:  
SCREENING INSTRUMENT

## KINDERGARTEN READINESS SCREENING INTERVIEW

Corly Dideriksen, Ph. D.  
Child Development  
Iowa State University

This screening measure was developed to attempt to determine a five-year-old child's developmental readiness level. The screening interview is derived from several measures including the Santa Clara Developmental Profile, the Denver Developmental Screening Test, the Stanford-Binet Intelligence Scale, the Gesell Developmental, and the Marshalltown Behavioral Developmental Profile.

This screening interview consists of five subsections:

1. Behavioral Checklist
2. Fine Motor
3. Memory-visual/auditory
4. Large Motor
5. Language

The interview is administered by a trained interviewer and takes about 30 minutes to complete.

### Materials needed:

copy of interview form  
two pencils  
plain paper  
copy form cards  
masking tape  
cover sheet  
3 visual memory pattern cards  
number matching sheet

screening profile  
10 colored rods  
cutting pattern sheet  
child's scissors  
6 inch ball  
puzzle  
6 squares 1 1/2" X 1 1/2"  
(2 red, 2 blue, 2 yellow)  
picture sequence

**READINESS SCREENING INTERVIEW**  
 Dideriksen, revised 1988

Child's Name: \_\_\_\_\_

**Introductory remarks to child:**

--Begin by having the child complete a simple puzzle. The purpose is to ease adjustment, not to evaluate the child's performance.

--Explain there are some things you would like to know about the child and you will be asking the child to do some things for you.

--Explain that you will be writing some things down to help you remember.

--Assure the child that he/she doesn't need to know everything and to be sure to ask questions if he/she doesn't understand.

**A. \_\_\_\_\_ Behavioral Checklist**

(24) (Score: 3-1 for each observed behavior. Complete this scoring at the end of the entire screening interview.)

\_\_\_\_\_ separates from parent, goes to chair and sits cooperatively  
 (3)

\_\_\_\_\_ erect posture, eye contact  
 (3)

\_\_\_\_\_ calm, confident, self-assured  
 (3)

\_\_\_\_\_ attends well to task  
 (3)

\_\_\_\_\_ waits for direction, able to follow directions  
 (3)

\_\_\_\_\_ appropriate pencil grasp  
 (3)

\_\_\_\_\_ has established handedness  
 (3)

\_\_\_\_\_ Interview: (score on basis of 3-1 regarding expressive  
 (3) language, awareness, readiness of response, fluency, maturity, etc.)

**Questions for interview on page 2.**

**Interview**

Do you have any pets? (alternate: favorite toys) Tell me about them.

Who do you like to play with?

What kinds of things do you like to do?

Have you ever gone to a party?

What do you remember? (Who came, what did you do, etc.)

**B.          Fine Motor Coordination**  
**(24)**

**Draw a Person**

- (3) (Score: This item will be scored twice. For number of parts in drawing score 3 = a head and 6 parts or more, 2 = a head and 4 parts or more, 1 = less than 4 parts. Parts would be eyes, nose, mouth, body, arms, legs, hands, etc.)

- (3) (Score the second time for developmental assessment of drawing. 3 = developmentally appropriate drawing, 2 = approximate appropriateness, 1 = less than age appropriate)

**ADMINISTRATION:** Ask the child to draw a picture of a person.

**Print Name**

- (3) (Score: 3-1 based on developmental appropriateness)

**ADMINISTRATION:** Ask the child to turn the paper over and print his/her name.



**Copy Forms**

---

(12)

**ADMINISTRATION:** Give the child a new sheet of paper. Present each copy form to the child, one at a time by placing it at the upper edge of the paper. Ask the child to "Make one like this on the paper." (Mark the beginning point and directionality on shapes below.)

**Circle**


---

(3) (Score: number of following correct-one continuous line, no corner, closes to form a circle at beginning point)
**Cross**


---

(3) (Score: vertical down, horizontal L to R, order VH)
**Square**


---

(3) (Score: CCW, one continuous line, 4 corners)
**Triangle**


---

(3) (Score: straight lines, two to three strokes, approximates equilateral)
**Cutting**


---

(3) (Score: 3 = successful, 2 = some difficulty, 1 = great difficulty)

**ADMINISTRATION:** Give the child a scissors and a marked cutting paper. Remove everything else from the table. Ask the child to cut on each line, stopping when he/she gets to the double line.

C.

Memory  
(18)

Auditory Memory  
(9)

Clapping sequence  
(3) (Score: number correct)

**ADMINISTRATION:** Clap the following patterns and ask the child to repeat the pattern by clapping. You should give the child a practice with a two clap sequence. (Clap, Clap) Ask the child to wait to begin clapping until your hands are in your lap.

(Clap, Clap, Clap)  
(Clap, Clap, Clap, Clap)  
(Clap, (Clap, Clap) Clap)

Repeat Numbers  
(3) (Score: number correct)

**ADMINISTRATION:** Tell the child, "I am going to say some numbers. Please say them back to me after I say them."

6	-	2	-	9	
8	-	3	-	1	
4	-	7	-	3	- 2

Repeat sentences  
(3) (Score: number correct)

**ADMINISTRATION:** Tell the child, "I am going to read a sentence. Listen carefully and say it back to me after I say it."

"The dog ran across the street."  
"John had a good time on his trip to the beach."  
"Mary wants to make a shirt for her doll."

**Visual Memory**(9)**Recall color sequence**(3) (Score: number correct)

**ADMINISTRATION:** Show a child a card with 3 squares (red, yellow, blue) on it, for about 5 seconds. Point to each square, left to right saying, "First this, then this." Remove card. Say, "Use these squares and make a design just like mine." Repeat with 2 remaining cards.

**Match numbers**(3) (Score: number correct)

**ADMINISTRATION:** Give the child a pencil and the number matching sheet. Use a cover sheet to cover items on the page not being examined by the child. Begin with the top row. Say, "In each row, put a circle around all the numbers in the row that are just like the number in the circle."

**Picture sequence**(3) (Score: number correct)

**ADMINISTRATION:** Use a cover sheet to cover the items on the page not being examined by the child. Begin with the top row. Say to the child, "Look at these pictures and try to remember what you see." Point to the pictures one at a time from left to right. Let the child view the pictures for approximately 5 seconds. (It's better if the child does not verbalize.) Cover the pictures and ask the child to tell what he/she saw in the same sequence in which the pictures were presented.

       spoon-fish-cup(1)       chair-apple-table(1)       dog-book-cat-bird(1)

D.          Large Motor

(21) (Scoring on all large motor tasks: 3 = successful, 2 = some difficulty, 1 = great difficulty)

**ADMINISTRATION:** Place two 5 foot strips of masking tape on the floor approximately 2 feet apart. Ask the child to do the following tasks: (You may have to demonstrate, allow 3 trials at each task.)

         balances on one foot 10 seconds  
(3)

         heel to toe walk, length of tape  
(3)

         backward heel to toe walk length of tape  
(3)

         jumps on both feet 3 times between tape  
(3)

         hops on one foot 3 times between lines of tape  
(3)

         catches bounced ball 3 times  
(3) Stand about 3 feet from the child and bounce the ball, taking care to have the ball bounce once halfway between the tester and the child. The ball should reach the child between his/her neck and waist. The child is told to catch the ball. Score a pass if the child catches the ball with his/her hands and not his/her arms. The child may catch the ball against the body only if he/she uses his/her hands and not arms.

         throws ball 3 times  
(3) Ask child to throw the ball to you (3 feet). Score a pass if child is able to toss ball in forward direction so it can easily be caught. Do not have the child bounce the ball.

E. Language  
(24)

Naming Animals

(3) (Score: 3 = 7 to 15; 2 = 3 to 6; 1 = 0 to 2)

**ADMINISTRATION:** Tell the child, "I am going to give you some time and I would like you to name all the animals you can of. Ready.....Go." Encourage the child to name animals for up 60 seconds.

Word definition

(3) (Score: 3 = 6 of 9 correct 2 = 4 or 5 of 9 correct; 1 = less than 4. Definition is correct if child defines in terms of use, shape, what it is made of, or general category.)

**ADMINISTRATION:** "I am going to say a word and I want you to tell me what it is."

What is a:

ball  
lake  
desk  
envelope  
puddle  
curtain  
ceiling  
forest  
cliff

Opposite Analogies

(3) (Score: number correct)

**ADMINISTRATION:** Tell the child to listen and fill in the word you leave out at the end of each sentence.

"Fire is hot, ice is \_\_\_\_\_?" (cold, cool, freezing;  
not wet, melts, water)

"A girl grows to be a woman, a boy grows to be a \_\_\_\_\_?"  
(man; not Daddy, husband)

"A horse is big, a mouse is \_\_\_\_\_?" (little, small, tiny)

**Understanding**

(3) (Score: number correct)

**ADMINISTRATION:** Ask the child the following questions, one at a time.

"What has four wheels?" \_\_\_\_\_ (any 4-wheeled object)

"What is ice when it melts?" \_\_\_\_\_ (water, wet)

"What makes a cloudy day bright?" \_\_\_\_\_ (sun)

**Communication/Concepts****Number (counting)**

(3) (Score: 3 = counts to 10, 2 = counts to 5-9, 1 = less than 5)

**ADMINISTRATION:** Lay the 10 colored rods on the table in random fashion. Tell the child, "These are rods. How many do I have?"

**Alike**

(3) (Score: number correct)

**ADMINISTRATION:** Leave the rods on the table and ask the child:

"Find two rods that are exactly the same and show them to me."

"How are they the same?"

"Tell me another way they are alike?" (shape, color, length)

**Different**

(3) (Score: number correct)

**ADMINISTRATION:** Leave the rods on the table and ask the child:

"Find two rods that are different and show them to me."

"How are they different?"

"Tell me another way they are different." (length, color)

**Color**

(3) (Score: 3 = 7 of 9 correct, 2 = 5-6 correct, 1 = less than 5 correct)

**ADMINISTRATION:** Leave all the rods on the table and ask the child:

"Tell me the colors of these rods."

## VISUAL PERCEPTION

---

**8**

---

**2**

**5**

**8**

**3**

**8**

**6**

---

---

**2**

---

**4**

**2**

**6**

**7**

**2**

**3**

---

---

**5**

---

**9**

**5**

**6**

**3**

**7**

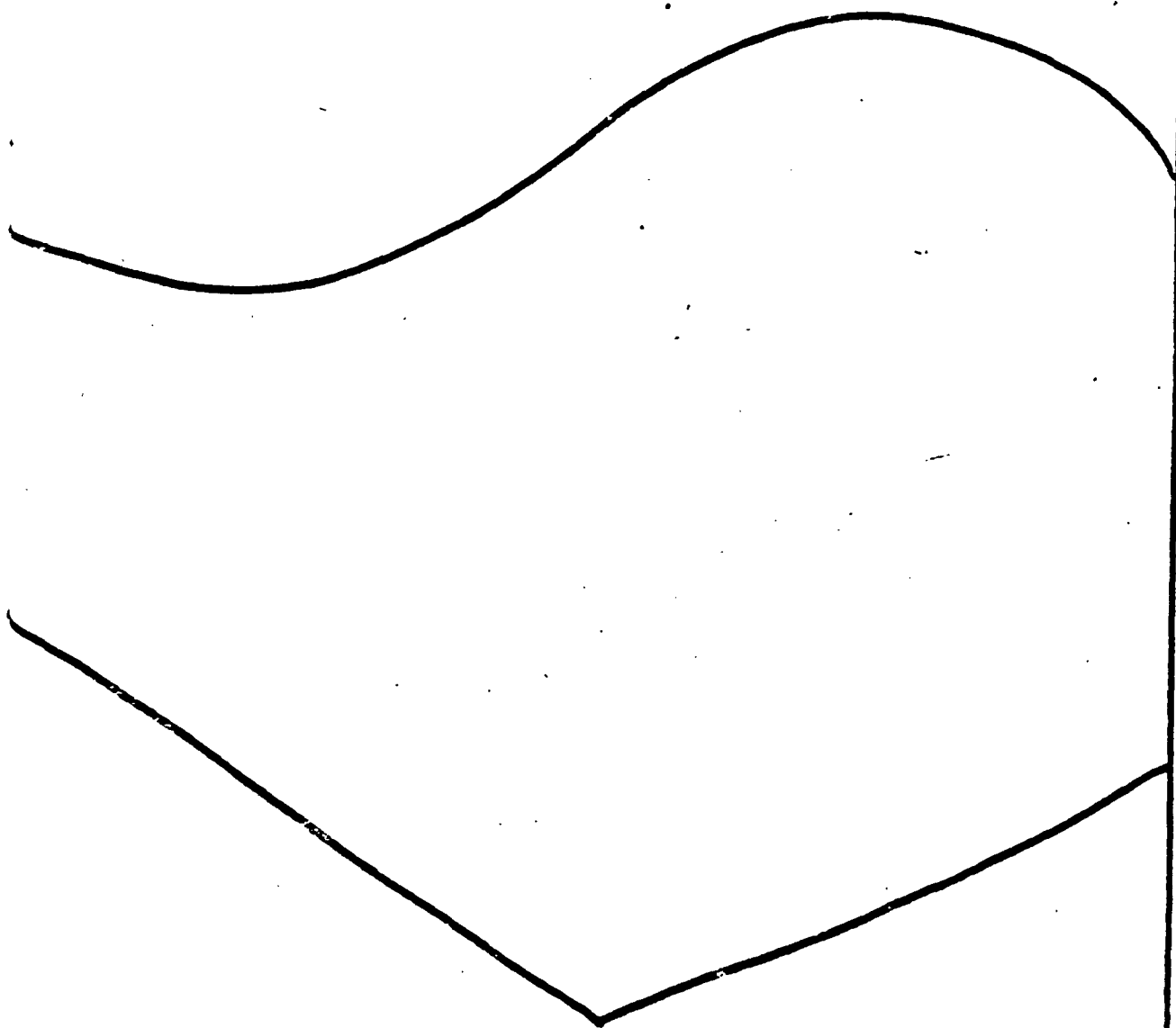
**5**

---

SCREENING INSTRUMENT  
CUTTING

CUT TO THIS LINE

75





APPENDIX B:  
SCREENING RECORDING SHEET

# READINESS SCREENING INTERVIEW OVERALL RECORDING SHEET

Interviewer  
Recommendation:

Child's Name: \_\_\_\_\_

\_\_\_Special Referral

Date of Interview: \_\_\_\_\_

\_\_\_Developmental

Name of Interviewer: \_\_\_\_\_

\_\_\_Borderline

\_\_\_Kindergarten

A. \_\_\_ Behavioral Checklist (24) pg. 1

COMMENTS:

B. \_\_\_ Fine Motor (24) pg. 2  
     Draw a person (6) \_\_\_  
     Print name (3) \_\_\_  
     Copy forms (12) \_\_\_  
     Cutting (3) \_\_\_

C. \_\_\_ Memory (18) pg. 4  
     Auditory  
         Clapping sequence (3) \_\_\_  
         Repeat numbers (3) \_\_\_  
         Repeat sentences (3) \_\_\_  
     Visual  
         Recall color sequence (3) \_\_\_  
         Match numbers (3) \_\_\_  
         Picture sequence (3) \_\_\_

D. \_\_\_ Large Motor (21) pg. 5  
     Balance (3) \_\_\_  
     Heel/toe (3) \_\_\_  
     Backwards (3) \_\_\_  
     Jumps (3) \_\_\_  
     Hops (3) \_\_\_  
     Catches bounced ball (3) \_\_\_  
     Throws ball (3) \_\_\_

E. \_\_\_ Language (24) pg. 6  
     Naming animals (3) \_\_\_  
     Word definition (3) \_\_\_  
     Opposite Analogies (3) \_\_\_  
     Understanding (3) \_\_\_  
     Communication/Concepts  
         Number (3) \_\_\_  
         Alike (3) \_\_\_  
         Different (3) \_\_\_  
         Colors (3) \_\_\_

Plot scores on profile. Any child who has 3 of 5 scores below the ready line is a candidate for developmental kindergarten.

# ANKENY COMMUNITY SCHOOL DISTRICT

## Kindergarten Screening Profile

Recommended Placement:

Developmental Kindergarten \_\_\_\_\_

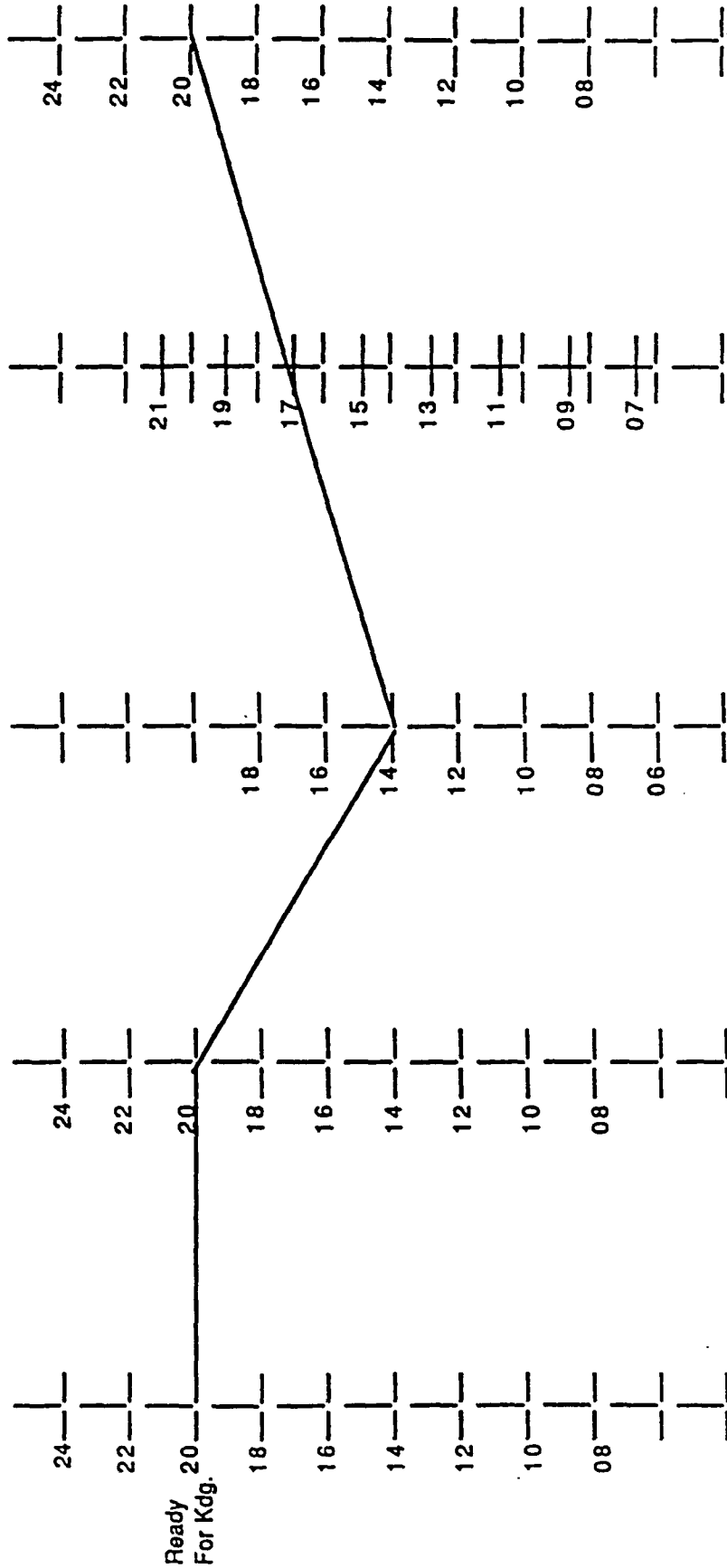
Kindergarten \_\_\_\_\_

Child's Name: \_\_\_\_\_

Date: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: (H) \_\_\_\_\_ (W) \_\_\_\_\_



A. Behavioral Checklist  
(8-24)

B. Fine Motor  
(8-24)

C. Memory-Visual /Auditory  
(6-18)

D. Large Motor  
(7-21)

E. Language  
(8-24)

APPENDIX C:  
PARENT FEEDBACK



## Ankeny Community Schools

306 S.W. SCHOOL STREET • P.O. BOX 189 • ANKENY, IOWA 50021-0189 • PHONE 515.965-9600

Dr. Ben Norman  
Superintendent of Schools  
Dr. Bob Hartzler  
Assistant Superintendent  
Dr. Jackie Pelz  
Director of Curriculum  
Harold D. Blatt  
Director of Student Services  
Kirk J. Naber  
Finance Director/Board Secretary

April, 1991

Dear Parents,

Attached to this letter is a profile sheet which illustrates your child's results on the kindergarten screening interview. The screening interview is derived from several measures which are norm-referenced to determine a five-year-old child's developmental readiness level.

The screening interview consists of five subsections:

1. Behavioral-This section consists of observations of the child's behavior and expressive language during the interview.
2. Fine Motor-This section is made up of eight different activities which determine the child's small motor coordination.
3. Memory-This section consists of six different activities which demonstrate the child's visual and auditory memory ability.
4. Large Motor-This section consists of seven different activities which determine the child's large motor coordination.
5. Language-This section consists of eight different activities which demonstrate the child's use and understanding of language.

Your child does not receive a composite score on this screening interview. Instead, the child's results in each subsection are plotted on the profile sheet. A red line connects the child's results. The black line on the profile sheet illustrates the cut-off in each subsection for kindergarten readiness. Any child who is below the readiness line in three or more subsections is a possible candidate for developmental kindergarten. Information from the parent survey is also taken into consideration when making placement recommendations.

Sincerely,

Dr. Jackie Pelz  
Director of Curriculum

JP/mb

**ANKENY COMMUNITY SCHOOL DISTRICT**

## Kindergarten Screening Profile

**Recommended Placement:**

Child's Name: \_\_\_\_\_

Developmental Kindergarten \_\_\_\_\_

Developmental Kindergarten\_

Date: \_\_\_\_\_ Kindergarten \_\_\_\_\_

## Kindergarten

Address: \_\_\_\_\_

Telephone: (H) \_\_\_\_\_ (W) \_\_\_\_\_

 $(w)$ 

(H)

**one**

Tel:

Ready  
For Kdg.

### A. Behavioral Checklist

### B. Fine Motor

### C. Memory-Visual /Auditory

### D. Large Motor

### E. Language

APPENDIX D:  
PARENT LETTER/RESEARCH



# Ankeny Community Schools

306 S.W. School Street • P.O. Box 189 • Ankeny, Iowa 50021-0189 • 515/965-9600

May 7, 1992

Dear Parent/Guardian,

I am an administrative intern from Iowa State University, working with Mr. Randy McMahon at East Elementary School in Ankeny. As part of my masters degree, I'm researching the impact of Developmental Kindergarten on student success in subsequent years of schooling as determined by test scores. I will be compiling data that includes composite test scores on the Iowa Test of Basic Skills and the Cognitive Abilities Test of students who have participated in Developmental Kindergarten since 1985 and comparing them to District composites. The identity of all students involved in the study will be kept strictly confidential, and no names will be contained in the final report. Further, no student records will be removed from the school office and all procedures are in compliance with school policy.

Please complete and return the attached slip indicating whether you do or do not give permission to have your child's scores included in the study. I have included a self-addressed stamped envelope and would like to have the slips returned by May 22, 1992. Feel free to contact me at home (274-9119), or Dr. Jackie Pelz at the Ankeny District office (965-9600) if you have further questions or concerns. If you are interested in receiving or reviewing a copy of the final report, the document will be available after August 1, 1992, at the District office.

Thank you for your cooperation in completing this study. Our goal is to provide the best for kids, this research will help us in our quest.

Sincerely,

Ms. Nancy S. Moorhead  
Dr. Jackie Pelz

---

## Check One

☐ Yes, I give permission to include my student's records in the study.

☐ No, I do not wish to have my student's records included in the study.

---

Signature of Parent/Guardian

---

Date